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Remarks/Arguments begin on page 23 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended):

An apparatus, comprising:

multiple sensors that produce multiple signals based on motions of a plurality of locations on an individual; and

one or more processing components that employ one or more of the multiple signals to make a determination of respective positional changes of the plurality of locations on the ~~individual;~~ individual,

wherein the multiple sensors are adapted to be in contact with the plurality of locations on the ~~individual, and~~ individual,

wherein the multiple sensors produce signals for the one or more processing components to measure three dimensional motion respectively of the plurality of locations on the ~~individual;~~ individual,

wherein the motions are measured and reconstructed from a known starting location and recorded position information to determine anthropometric dead reckoning of the individual to thereby construct a path traversed by the ~~individual~~ individual, and wherein the multiple sensors are integrated into a suit wearable by the individual.

Claim 2 (Previously presented):

The apparatus of claim 1, wherein the multiple sensors comprise multiple strain sensors.

Claim 3 (Previously presented):

The apparatus of claim 2,

wherein the multiple strain sensors comprise at least one strain sensor adjacent to a joint of the individual, and

wherein the at least one strain sensor experiences a strain in response to a joint motion of the joint of the multiple joint motions; and

wherein the at least one strain sensor represents the strain as strain information in a signal of the multiple signals; and

wherein one or more of the one or more processing components translates the strain information into the positional change of the individual.

Claim 4 (Previously presented):

The apparatus of claim 2,

wherein a strain sensor of the multiple strain sensors detects a bending of a joint of the individual, and wherein the strain sensor represents the bending as strain information in a signal of the multiple signals; and

wherein one or more of the one or more processing components employ the strain information to make a determination of a displacement of the positional change of the individual.

Claim 5 (Previously presented):

The apparatus of claim 2,

wherein a strain sensor of the multiple strain sensors detects a twisting of a joint of the individual, and

wherein the strain sensor represents the twisting as strain information in a signal of the multiple signals; and

wherein one or more of the one or more processing components employs the strain information to make a determination of a direction of the positional change of the individual.

Claim 6 (Previously presented):

The apparatus of claim 2,

wherein a first strain sensor of the multiple strain sensors detects a bending of a first joint of the individual, and

wherein the first strain sensor represents the bending as first strain information in a first signal of the multiple signals; and wherein one or more of the one or more processing components employ the first strain information to make a determination of a displacement of the positional change of the individual; and

wherein a second strain sensor of the multiple strain sensors detects a twisting of a second joint of the individual, and

wherein the second strain sensor represents the twisting as second strain information in a second signal of the multiple signals; and

wherein one or more of the one or more processing components employ the second strain information to make a determination of a direction of the positional change of the individual; and

wherein one or more of the one or more processing components employ the displacement of the positional change, the direction of the positional change, and the known starting location of the individual to make a determination of an updated position of the individual.

Claim 7 (Previously presented):

The apparatus of claim 1, further comprising

a filter component that weighs and combines:

the positional change determined by the one or more processing components based on the multiple joint motions of the individual; and position information from one or more supplementary navigation components.

Claim 8 (Previously presented):

The apparatus of claim 7,

wherein the supplementary navigation components comprise one or more of a global positioning system ("GPS") and an inertial navigation system ("INS"); and

wherein the filter component weighs and combines position information from the one or more processing components and the supplementary navigation components based on a relative reliability of the one or more processing components and the supplementary navigation components.

Claim 9 (Original):

The apparatus of claim 1, wherein one or more of the one or more processing components receive position correction information of the individual from one or more supplementary navigation components.

Claim 10 (Original):

The apparatus of claim 1, wherein one or more of the one or more processing components provide initial position information of the individual to one or more supplementary navigation components upon initialization of the one or more supplementary navigation components.

Claim 11 (Currently Amended):

The apparatus of claim 1, ~~wherein the multiple sensors are integrated into a suit wearable by the individual, and~~ wherein the multiple sensors are located in the suit at positions that are adjacent to multiple joints of the individual.

Claim 12 (Previously presented):

The apparatus of claim 1, further comprising

a magnetic heading sensor that provides direction information to one or more of the one or more processing components,

wherein the direction information of the magnetic heading sensor supplements the positional change determined by the one or more processing components; and

wherein the magnetic heading sensor employs the Earth's magnetic field to make a determination of a direction of the positional change of the individual.

Claim 13 (Previously presented):

The apparatus of claim 1, further comprising

a barometric altitude sensor that provides altitude information to one or more of the one or more processing components,

wherein the altitude information of the barometric altitude sensor supplements the positional change determined by the one or more processing components; and wherein the barometric altitude sensor measures an atmospheric pressure to make a determination of an altitude change of the positional change of the individual.

Claim 14 (Previously Presented):

The apparatus of claim 1, wherein the multiple sensors and the one or more processing components are calibrated to the individual by having the individual traverse a known path to monitor how multiple joint motions of the individual respond to the known path.

Claim 15 (Previously presented):

The apparatus of claim 1,

wherein the one or more processing components calculate an updated position of the individual based on the known starting location and the positional change of the individual; and

wherein the one or more processing components send the updated position of the individual to one or more of a display component and a recording component.

Claim 16 (Previously presented):

The apparatus of claim 1, wherein the multiple sensors comprise multiple rate sensors.

Claim 17 (Withdrawn):

The apparatus of claim 1, further comprising

one or more supplementary navigation components, wherein one or more of the one or more supplementary navigation components are integrated into a shoe worn by the individual;

wherein the one or more of the one or more supplementary navigation components initiate one or more zero velocity updates at a time when the shoe worn by the individual is substantially stationary.

Claim 18 (Withdrawn):

A method, comprising the steps of:

measuring one or more movements of one or more joints of an individual;

translating the one or more movements into a positional change of the individual; and

reconstructing the one or more movements to determine a path traversed by the individual,

wherein the path is used to create a map of an area.

Claim 19 (Withdrawn):

The method of claim 18, wherein the step of measuring the one or more movements of the one or more joints of the individual comprises the step of:

measuring a strain on a strain sensor induced on the strain sensor by movement of the joint adjacent to the strain sensor.

Claim 20 (Withdrawn):

The method of claim 19, wherein the step of translating the one or more movements into the positional change of the individual comprises the step of:

analyzing characteristics of the strain induced on the strain sensor to determine a displacement and a direction of the positional change of the individual.

Claim 21 (Withdrawn):

The method of claim 18, further comprising the step of:

adding the positional change of the individual to a known starting location of the individual to determine an updated position of the individual.

Claim 22 (Withdrawn):

An article, comprising:

one or more computer-readable signal-bearing media;

means in the one or more media for measuring one or more movements of one or more joints of an individual;

means in the one or more media for translating the one or more movements into a positional change of the individual; and

means in the one or more media for reconstructing the one or more movements to determine a path traversed by the individual from a known starting location, wherein the path is used to create a map of an area.

Claim 23 (Previously Presented):

The apparatus of claim 1, wherein the multiple sensors are arranged bi-laterally on the individual.

Claim 24 (canceled):

Claim 25 (Currently Amended):

An apparatus, comprising:

multiple sensors that produce multiple signals based on motions of an ~~individual; and~~ individual;

at least one processing component that employs respective multiple signals to make a determination of respective positional changes of a plurality of locations on the ~~individual;~~ individual,

wherein the multiple ~~sensors~~ sensors are in contact with the plurality of locations on the individual,

wherein the multiple sensors ~~producing~~ produce signals for the at least one processing component to measure three dimensional motion respectively of the plurality of locations on the ~~individual;~~ individual, and

wherein the motions are measured and reconstructed ~~the motions~~ from a known starting location and recorded position information to determine anthropometric dead reckoning of the individual; and a map of an environment, which the individual is in, derivable from the anthropometric dead reckoning of the individual.

Claim 26 (Previously Presented):

The apparatus according to claim 25, wherein the map of the environment, which the individual is in, is one of a map of an area previously unmapped, is a corrected map of an incorrectly mapped area, and an updated map of an outdated map of an area.

Claim 27 (Currently Amended):

An apparatus, comprising:

multiple sensors that produce multiple signals based on motions of an ~~individual; and~~ individual;

at least one processing component that employs respective multiple signals to make a determination of respective positional changes of a plurality of locations on the ~~individual;~~ individual,

wherein the multiple sensors are in contact with the plurality of locations on the individual,

wherein the multiple sensors ~~producing~~ produce signals for the at least one processing component to measure three dimensional motion respectively of the plurality of locations on the ~~individual;~~ individual, and wherein the motions are measured and reconstructed from a known starting location and recorded position information to determine anthropometric dead reckoning of the individual; and

data indicative of the measured and reconstructed motions,

wherein the data ~~being~~ is fed back to the individual and wherein the data is fed back to at least one of the sensors on the individual.

Claim 28 (Canceled):

Claim 29 (Currently Amended):

An apparatus, comprising:

multiple sensors that produce multiple signals based on motions of respective joints of an individual; and

at least one processing component that employs respective multiple signals to make a determination of respective positional changes of the respective joints of the ~~individual;~~ individual,

wherein the multiple sensors are in contact with the respective joints of the individual,

wherein the multiple sensors ~~producing~~ produce signals for the at least one processing component to measure three dimensional motion respectively of the respective joints of the ~~individual;~~ individual, wherein the motions are measured and reconstructed from a known starting location and recorded position information to determine anthropometric dead reckoning of the ~~individual; and~~ individual,

wherein the multiple sensors comprise a plurality of different sensors that measure a plurality of different parameters of the ~~individual~~ individual, and

wherein the multiple sensors comprise

a barometric altitude sensor that measures atmospheric pressure for altitude position changes.

Claim 30 (Currently Amended):

The apparatus according to claim 29,

wherein the multiple sensors comprise

at least one of strain sensor that measures motion,

gyroscope that measures angular rate,

accelerometer that measures linear motion,

~~barometric altitude sensor that measures atmospheric pressure for altitude position changes,~~ and

magnetic heading sensor that provides information on the direction of the movement of the individual.

Claim 31 (Previously presented):

The apparatus according to claim 29, wherein the multiple sensors comprise at least a first sensor that measures direction of movement of the individual and a second sensor that measures displacement of movement of the individual.

Claim 32 (Currently Amended):

An apparatus, comprising:

multiple sensors that produce multiple signals based on multiple joint motions of an individual,

wherein the multiple joint motions refer to a body movement of the ~~individual; and~~ individual;

one or more processing components that employ one or more of the one or more signals to make a determination of a positional change of the ~~individual;~~ individual,

wherein the multiple joint motions are measured and reconstructed from a known starting location and recorded position information to determine a path traversed by the ~~individual,~~ individual and

wherein the path is used to create a map of ~~an area~~ an area; and

a barometric altitude sensor that provides altitude information to at least one of the one or more processing components.

Claim 33 (Previously Presented):

The apparatus of claim 32, wherein the multiple sensors comprise multiple strain sensors.

Claim 34 (Previously Presented):

The apparatus of claim 33,

wherein the multiple strain sensors comprise a strain sensor adjacent to a joint of the individual,

wherein the strain sensor experiences a strain in response to a joint motion of the multiple joint motions; and

wherein the strain sensor represents the strain as strain information in a signal of the one or more signals; and

wherein one or more of the one or more processing components translates the strain information into the positional change of the individual.

Claim 35 (Previously Presented):

The apparatus of claim 33,

wherein a strain sensor of the multiple strain sensors detects a bending of a joint of the individual, and

wherein the strain sensor represents the bending as strain information in a signal of the multiple signals; and wherein one or more of the one or more processing components employ the strain information to make a determination of a displacement of the positional change of the individual.

Claim 36 (Previously Presented):

The apparatus of claim 33,

wherein a strain sensor of the multiple strain sensors detects a twisting of a joint of the individual, and

wherein the strain sensor represents the twisting as strain information in a signal of the multiple signals; and

wherein one or more of the one or more processing components employs the strain information to make a determination of a direction of the positional change of the individual.

Claim 37 (Previously Presented):

The apparatus of claim 33,

wherein a first strain sensor of the multiple strain sensors detects a bending of a first joint of the individual, and

wherein the first strain sensor represents the bending as first strain information in a first signal of the multiple signals; and

wherein one or more of the one or more processing components employ the first strain information to make a determination of a displacement of the positional change of the individual; and wherein a second strain sensor of the multiple strain sensors detects a twisting of a second joint of the individual, and

wherein the second strain sensor represents the twisting as second strain information in a second signal of the multiple signals; and

wherein one or more of the one or more processing components employ the second strain information to make a determination of a direction of the positional change of the individual; and

wherein one or more of the one or more processing components employ the displacement of the positional change, the direction of the positional change, and the known starting location of the individual to make a determination of an updated position of the individual.

Claim 38 (Previously Presented):

The apparatus of claim 32, further comprising

a filter component that weighs and combines:

the positional change determined by the one or more processing components based on the multiple joint motions of the individual; and

position information from one or more supplementary navigation components.

Claim 39 (Previously Presented):

The apparatus of claim 38,

wherein the supplementary navigation components comprise one or more of a global positioning system ("GPS") and an inertial navigation system ("INS"); and

wherein the filter component weighs and combines position information from the one or more processing components and the supplementary navigation components based on a relative reliability of the one or more processing components and the supplementary navigation components.

Claim 40 (Previously Presented):

The apparatus of claim 32, wherein one or more of the one or more processing components receive position correction information of the individual from one or more supplementary navigation components.

Claim 41 (Previously Presented):

The apparatus of claim 32, wherein one or more of the one or more processing components provide initial position information of the individual to one or more supplementary navigation components upon initialization of the one or more supplementary navigation components.

Claim 42 (Previously Presented):

The apparatus of claim 32,

wherein the multiple sensors are integrated into a suit wearable by the individual, and wherein the multiple sensors are located in the suit at positions that are adjacent to one or more joints of the individual.

Claim 43 (Previously Presented):

The apparatus of claim 32, further comprising a magnetic heading sensor that provides direction information to one or more of the one or more processing components,

wherein the direction information of the magnetic heading sensor supplements the positional change determined by the one or more processing components; and

wherein the magnetic heading sensor employs the Earth's magnetic field to make a determination of a direction of the positional change of the individual.

Claim 44 (Currently Amended):

The apparatus of claim 32, ~~further comprising a barometric altitude sensor that provides altitude information to at least one of the one or more processing components,~~

wherein the altitude information of the barometric altitude sensor supplements the positional change determined by the one or more processing ~~components;~~ components and

wherein the barometric altitude sensor measures an atmospheric pressure to make a determination of an altitude change of the positional change of the individual.

Claim 45 (Previously Presented):

The apparatus of claim 32, wherein the multiple sensors and the one or more processing components are calibrated to the individual by having the individual traverse a known path to monitor how the multiple joint motions of the individual respond to the known path.

Claim 46 (Previously Presented):

The apparatus of claim 32,

wherein the one or more processing components calculate an updated position of the individual based on a known starting position and the positional change of the individual; and

wherein the one or more processing components send the updated position of the individual to one or more of a display component and a recording component.

Claim 47 (Previously Presented):

The apparatus of claim 32, wherein the multiple sensors comprise multiple rate sensors.

Claim 48 (Withdrawn):

The apparatus of claim 32, further comprising

one or more supplementary navigation components,

wherein one or more of the one or more supplementary navigation components are integrated into a shoe worn by the individual; and wherein the at least one of the one or more supplementary navigation components initiate one or more zero velocity updates at a time when the shoe worn by the individual is substantially stationary.

Claim 49 (Withdrawn):

A method, comprising the steps of

measuring multiple movements of one or more joints of an individual;

translating the multiple movements into a positional change of the individual; and

reconstructing the multiple movements from a known starting location and recorded position information to determine a path traversed by the individual,

wherein the path is used to create a map of an area.

Claim 50 (Withdrawn):

The method of claim 49, wherein the step of measuring the multiple movements of the one or more joints of the individual further comprises the step of:

measuring a strain on a strain sensor induced on the strain sensor by movement of the joint adjacent to the strain sensor.

Claim 51 (Withdrawn):

The method of claim 50, wherein the step of translating the multiple movements into the positional change of the individual further comprises the step of:

analyzing characteristics of the strain induced on the strain sensor to determine a displacement and a direction of the positional change of the individual.

Claim 52 (Withdrawn):

The method of claim 49, further comprising the step of

adding the positional change of the individual to the known starting location of the individual to determine an updated position of the individual.